## Space Weather Forecast

Issued on Thursday 26 December 2024 at 01:18 Local

**This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Occasional Minor/Moderate (R1/R2) radio blackouts expected throughout. A chance of Minor/Moderate (G1/G2) geomagnetic storms in next 24 hours.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity has reduced somewhat but remains Moderate, with one double peak Moderate flare observed, this was observed with a contribution from AR3938 in the northeast and AR3932 near centre disk at 25/0444UTC.

There are now up to twelve sunspot regions on the disc, with one unnumbered region near the southeastern horizon, and a larger single spot also in the southeast numbered AR3939. The most-changed regions on the disc included AR3938 in the northeast, which saw areal growth in its northern intermediate spots. AR3933 near centre-disc showed proliferation and then fading in its intermediate portions, which was matched at the same longitude by development and further fading in trailing spots in AR3928 to its immediate south. AR3932 in the southeast showed areal decay throughout - especially in its leading group. All the remaining groups were unchanged on the disc, aside from AR3934 in the northeast, which consolidated and faded in the period.

A Type II radio emission with an estimated speed of 1064km/s was observed at 25/0447UTC. This was almost concurrent with the peak flare of the period from AR3932, however recent coronagraph imagery instead suggests a large and fast CME is not expected, with a slower feature visible, largely southward directed although we await full model analysis of this feature to fully assess any Earth-directed competent.

Further CMEs observed in available coronagraph imagery are judged not to have a Earth-directed threat, although analysis continues into a CME visible moving northeast in coronagraph imagery from 25/1730UTC onwards.

**Solar Wind / Geomagnetic Activity:** Solar winds showed a waning connection to a coronal hole fast wind. The solar wind speed fell from elevated levels to reach slightly elevated levels by the period's end. The number of particles in the solar wind showed a concurrent rise within normal background, which is perhaps the resumption of the ambient wind density. The associated magnetic field was at typical levels, with a small-scale erratic north-south component.

The net result of the above solar wind measures was for provisionally Quiet geomagnetic activity.

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**Energetic Particles / Solar Radiation:** High energy proton flux (greater than 10MeV) showed a continuing gradual decline, below the S1/Minor Radiation Storm threshold.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Further Moderate-class flares are expected, with a slight chance of isolated Strong-class flares throughout.

**Solar Wind / Geomagnetic Activity:** A CME from 23 December may give a glancing blow at Earth on Day 1 (26 Dec), with some uncertainty in the timing of this feature. No other CMEs currently feature in the forecast, although confidence in this aspect of the forecast is lower than usual. Solar winds are slightly elevated but slowly declining due to a waning connection to a faster solar wind flow.

Overall, geomagnetic activity is expected to be mainly Quiet to Unsettled during the forecast period, but with a Chance of peak G1-G2/Minor-Moderate Storm levels Day 1 (26 Dec) due to potential CME influence, with lower than usual confidence given the forecast uncertainties.

**Energetic Particles / Solar Radiation:** There is a slight chance of S1/Minor Radiation Storm or greater enhancements during the period. In the absence of any further notable flares, ongoing slightly enhanced high-energy proton counts should ease towards background levels in the coming days.

## Geomagnetic Storms

| Geomagnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| **Minor or Moderate** | **G1 to G2** | No | 50 | 10 | 5 | 5 |
| **Strong** | **G3** | No | 5 | 1 | 1 | 1 |
| **Severe** | **G4** | No | 1 | 1 | 1 | 1 |
| **Extreme** | **G5** | No | 1 | 1 | 1 | 1 |

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## Radio Blackouts - X-Ray Flares

| X-Ray Flares | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|---|---|---|---|---|---|---|
| Probability | | | (%) | (%) | (%) | (%) |
| Active | R1-R2 (M Class) | Yes | 80 | 80 | 80 | 80 |
| Very Active | R3-R5 (X Class) | No | 15 | 15 | 15 | 15 |

## Solar Radiation Storms (High Energy Protons)

| Radiation Storms | Level ($cm^{-2}sr^{-1}s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|---|---|---|---|---|---|---|
| Probability (Exceedance) | | | (%) | (%) | (%) | (%) |
| Active | ≥ S1 | No | 15 | 15 | 20 | 20 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |
| * S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$) | | | | | | |

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